



The Regional Biomass Energy Program (RBEP) promotes increased production and use of bioenergy resources, and helps advance the use of renewable biomass feedstocks and technologies. Historically, the RBEP leverages two nonfederal dollars for every federal dollar it administers.

Benefits of Biomass Co-Firing

- Provides a clean, renewable fuel for power plants to reduce coal use without requiring major technology changes
- Creates a new cash crop for area farmers
- Reduces carbon dioxide emissions equal to the output of 30,000 cars and generates electricity equal to 18,000 large solar panels when biomass is co-fired in a mid-sized power plant
- Provides reforestation in environmentally damaged areas

“Current regulatory and market realities do not make it cost-effective for utilities to build stand-alone biomass-based power plants. Co-firing with biomass fuels utilizes existing power plant infrastructure to minimize capital costs while maximizing environmental and economic benefits.”

Steve Segrest, Director
Common Purpose Institute



U.S. Department of Energy
Regional Biomass Energy Program

www.ott.doe.gov/rbep

ANOTHER RBEP SUCCESS: Biomass co-firing in existing power plants

CHALLENGE

Each year, Florida’s electric utilities spend approximately \$3 billion to buy fossil fuels, almost all of which are imported into the state, including coal from Kentucky. Coal-fired plants generate more than 36% of Florida’s electricity, and while the plants all meet or exceed current clean air standards, they still produce emissions, such as nitrogen oxides that have been linked to smog formation, and carbon dioxide, a greenhouse gas.

Supplementing a portion of the coal used in Florida power plants by co-firing with a locally grown, renewable biomass fuel could help improve regional air quality, create a new cash crop for local farmers, reduce dependence on non-renewable fuel sources, and retain energy expenditures locally.



These trees will be harvested for biomass co-firing.

RBEP SOLUTION

With its large landbase, nearby power plants, and warm climate, Florida and much of the southeastern U.S. are well suited to growing and using energy crops. The U.S. Department of Energy’s Regional Biomass Energy Program is helping fund research in Florida into ways to cultivate and harvest fast-growing trees as a renewable fuel source for electric utilities. Researchers have developed a pilot “energy crop plantation” of approximately 130 acres (about 500,000 trees) of eucalyptus and native cottonwood trees on a closed phosphate mine. The plantings include new “Super Trees” developed by the University of Florida and Shell Energy that can grow 20 feet per year, producing 55 green tons (or 24 dry tons) per acre each year.

The eucalyptus and cottonwood trees “coppice” or regrow after each cutting, so they can be harvested every 1 to 3 years as a short-rotation crop, which significantly increases biomass production. Other research involves determining the best pre-processing (shredding) methods for the wood, the optimal mix of biomass and coal (roughly 5% biomass to 95% coal), and the most efficient co-firing operation to maximize biomass usage and power generation.

Partners

U.S. Department of Energy
Regional Biomass Energy Program
Common Purpose Institute for
Energy & Environmental Solutions
University of Florida
Shell Energy Company, LLC
Polk County Extension Office
Lake Region Audubon Society
Florida Department of
Community Affairs
Florida Institute of
Phosphate Research

*The trees are shredded and processed
for use as biomass fuel.*



Web-based Biomass Information Resources

Common Purpose Institute for
Energy & Environmental Solutions
<http://www.treepower.org>
National Renewable Energy
Laboratory
<http://www.nrel.gov>

For more information:

Kathryn Baskin
Southern States Energy Board
6325 Amherst Court
Norcross GA 30092
Phone: (770) 242-7711
Fax: (770) 242-9956
E-mail: baskin@sseb.org

RESULTS

Collaborative engineering and research efforts resulted in the U.S. Environmental Protection Agency and the State of Florida permitting two existing coal-fired power plants to co-fire biomass made from trees. Permitting has begun for a third unit that would involve the first commercialization of biomass co-firing in an integrated gasification combined-cycle power plant, which generates electricity cleanly from solid fuels such as coal, petroleum coke, and now biomass.

In test harvests using conventional equipment, energy crop yields on the plantation reached the target of 55 green tons per acre and harvesting costs were approximately \$1.16 per one million BTUs (MMBTU). These yield and harvest figures lead researchers to project an estimated cost of \$1.76 per MMBTU for the energy crop. The \$1.76 per MMBTU figure meets the target of delivering energy crop MMBTU costs with no more than a 5-10% premium over the current \$1.50-1.75 per MMBTU cost for coal.

BENEFITS

As competition spreads throughout the electric power industry, utilities are looking for ways to help ensure the loyalty of their customers – of which the majority in national polls indicates they prefer energy from renewable sources over other energy sources. (Up to 70% of those polled are willing to pay at least \$5 more per month for electricity from renewable sources.*) Using biomass to generate a portion of their electricity will help electric utilities reduce their reliance on non-renewable fuel, stay in compliance with air quality standards, and offer consumers the option of using “Green Energy” (energy produced in whole or in part from renewable energy).

Energy crops can be used to reforest lands, including 400,000 acres of phosphate mine spoil lands in central Florida, and provide a cash crop for farmers. In fact, if Florida’s electric utilities used energy crop fuels to generate just 2% of total electricity produced, this would create a new farming industry in the state, with an estimated economic impact of more than \$100 million (Source: Central Florida Development Council).

**Research indicates that 21-70% of electricity customers would consider paying a premium for Green Energy. (Research includes a July 1999 study by the U.S. Department of Energy’s National Renewable Energy Laboratory: NREL/TP.550.26148)*

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